**Smart Street Lighting System**

**Introduction**

* As a matter of fact, the trending demand of alternatives sources of energy is required to the growing demands of the people.
* Finding an Alternative resource to supply the power.
* By reducing the energy consumption of the present resources available.

**Objective**

* To provide lightning to the streets such that minimum possible power is consumed.
* To manage the traffic flow smoothly and efficiently during night.
* To replace the conventional halogen lamps with the power LED’s in the lighting system.

**Block Diagram**

Microcontroller

Ultrasonic Sensor

Power LED

LM 324 Assembly

Relay Circuit

* The sole purpose of this project is to reduce the power consumption across a street.
* This kind of project is mainly appropriate in urban cities where most of the power is wasted in lighting up the streets when there is a minimum traffic flow during late nights.

**Specifications**

* **Microcontroller -** Heart of the circuit (Atmega 32 development board)
* **Ultrasonic Sensor -** Kept away from 10cm senses the vehicles and corresponding required LED’s.
* **Relay Circuit -** It shows difference between day and night Intensity of the light comes down during night the resistance increases which indicates the switch off the LED after 5 minutes.
* **LM324 -** Integrated chips of quad-op-amp(4) acts as a comparator for inputs on Inverting and Non-Inverting terminals.
* **Power LED -** It is rated at 2.5v, 300mA. It acts as output and connected to theport D of the microcontroller.

**Working**

**Case 1 : When an Ultrasonic Sensor Senses the Vehicle**

* In this case, the sensor detects the object and generates an analog output which is sent to the Inverting terminal of the OP-Amp(LM324).
* It is compare to the reference voltage set at 4.1V on the non-inverting terminal of the op-amp.
* Usually when a sensor detects the vehicle , it generates a voltage which tends to give the op-amp output equal to +Vcc = +5v.
* This Output(High) is sent to the PORTB of the microcontroller and the LED’s are switched on accordingly as per the program.
* The PORTD pins which are connected to the power LED’s I set HIGH in order to glow them at rated value
* Voltage across leds=3.5V
* Current across leds=290mA
* Power consumed=1Watt(approx.)

**Case 2 : When an Ultrasonic Sensor does not Senses the Vehicle**

* In this case, when there is no traffic flow across a street, the sensor does not detect any object and hence the output voltge of the sensor s higher than the reference voltage of 4.1V.
* This tends the output voltage of the op-amp to be +Vcc = Gnd.
* This Output(High) is sent to the PORTB of the microcontroller and there accordingly PORTD is set to operate the power LEDs.
* The PORTD pins is with a PWM signals can be achieved (consecutive HIGHs and LOWs).
* Voltage across leds=0.3V
* Current across leds=4mA
* Power consumed=1.2mWatt

**Conclusion**

* The idea of this project can be implemented in a large scale in many big cities, wher mot of the street lights are consuming useful power.
* This is a sincere effort in managing the traffic flow at night and reducing the amount of energy wasted in procedure.
* This project can also be implemented by using Python coding also.